

JA



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,900	09/09/2003	Larry E. Fischer	IL-11082	5644
7590 02/02/2005			EXAMINER	
Eddie E. Scott Assistant Laboratory Counsel Lawrence Livermore National Laboratory P.O. Box 808, L-703 Livermore, CA 94551			TRIEU, THAI BA	
			ART UNIT	PAPER NUMBER
			3748	
DATE MAILED: 02/02/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/657,900	Applicant(s) FISCHER ET AL.	
	Examiner Thai-Ba Trieu	Art Unit 3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-47 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9/9/03&1/13/04</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **"212"** (See Figure 2), and **"515"** and **"516"** (See Figure 5). Corrected drawing sheets, or amendment to the specification to add the reference character(s) in the description, are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character **"506"** has been used to designate both **"exhaust gas"** and **"air intake"** (See Figure 5); and **"620"** has been used to designate both **"engine starter"** and **"valve in the intake passage"** (See Figure 6). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if

Art Unit: 3748

only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference character(s) mentioned in the description: **"turbine 507"** (See Page 14, Paragraph [0032], lines 6-7). Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Note that Figure 5, **"507"** is used to label the compressor housing.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **"furnace"** (See claim 40), **"a boiler"** (See claim 41), **"a smelter"** (See claim 42), and **"bypass"**

valve" (See claim 44, lines 1- 2) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement-drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

- On Page 7, Paragraph [0016], line 6, **"bypass 211, and preheating system 212"** should be replaced by -- **bypass 210, and preheating system 211** --, to incorporate with Figure 2.

Appropriate correction is required.

Claim Objections

Claims 1 and 8 are objected to because of the following informalities:

- In claim 1, line 12, ***“means for supercharge”*** should be replaced by – **means for supercharging --**.

- In claim 8, line 9, ***“a supercharger for supercharge”*** should be replaced by – **a supercharger for supercharging --**.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 8-10, 16-23, 25, 26, 28-30, 32, 33, 35, and 36-47 are rejected under 35 U.S.C. 102(b) as being anticipated by Melchior (Patent Number 4,233,815).

Regarding claims 1-4, Melchior discloses a combustion engine apparatus, comprising:

a first stage piston engine (1, 101, 201) (See Figures 1-9, 10-11, 14-16),

fuel (Not numbered and contained in the reservoir 212) (See Figures 1-9, 10-11, 14-16);

means for combusting said fuel in said a first stage piston engine (1) in a first stage producing piston engine exhaust gases with said piston engine exhaust gases containing said fuel;

a second stage turbine engine (2, 4, 5) operatively connected to said first stage piston engine (1),

means for combusting said fuel (3, 30, 107, 208) contained in said piston engine exhaust gases in said second stage turbine engine producing turbine engine exhaust gases; and

means for supercharge (2, 20, 21, 103, 203, 302) said first stage piston engine using said turbine engine exhaust gases;

wherein said piston engine is a diesel engine (See Column 1, Lines 26-67, Column 2, lines 1-6);

wherein said piston engine is a compression ignition engine, a homogenous charged compression ignition engine, a variable compression engine, a nitrogen enriched air combustion engine, a rotating engine, a linear engine, and/or a reciprocating engine (See Column 1, Lines 26-67, Column 2, lines 1-6, Column 3, lines 63-68, and Column 4, lines 1-16);

wherein said means for combusting said fuel contained in said piston engine exhaust gases in said second stage turbine engine includes compressor means (2, 20, 21, 103, 203, 302) for providing compressed

Art Unit: 3748

air to said second stage turbine engine for combusting said fuel contained in said piston engine exhaust gases (See Figures 2-3, 5, 7-8, 10-11);

Regarding claims 8-10, Melchior discloses a combustion engine apparatus, comprising:

fuel (Not numbered and contained in the reservoir 212) (See Figures 1-9, 10-11, 14-16);

a first stage piston engine (1, 101, 201) for combusting said fuel in a first stage, said first stage piston engine producing piston engine exhaust gases with said piston engine exhaust gases containing said fuel (See Figures 1-9, 10-11, 14-16);

a second stage turbine engine (2, 4, 5) for combusting said fuel contained in said piston engine exhaust gases in a second stage, said second stage turbine engine (2, 4, 5) producing turbine engine exhaust gases; and

a supercharger (2, 20, 21, 103, 203, 302) for supercharge said piston engine using said turbine engine exhaust gases (See Figures 2-3, 5, 7-8, 10-11);

wherein said first stage piston engine is a compression ignition engine, a homogenous charged compression ignition engine, a variable compression engine, a nitrogen enriched air combustion engine, a rotating engine, a linear engine, and/or a reciprocating engine (See Column 1, Lines 26-67, Column 2, lines 1-6, Column 3, lines 63-68, and Column 4, lines 1-16);

a compressor (2, 20, 21, 103, 203, 302) for providing compressed air to said second stage turbine engine for combusting said fuel contained in said piston engine exhaust gases (See Figures 2-3, 5, 7-8, 10-11).

Regarding claims 16-23, Melchior discloses a combustion engine method that provides increased fuel efficiency and reduces polluting exhaust emissions by burning fuel in two stages, comprising the steps of:

combusting said fuel in a piston engine (1, 101, 201) in a first stage, said step of combusting said fuel in a piston engine in a first stage producing piston engine exhaust gases, said piston engine exhaust gases containing said fuel;

combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine (2, 4, 5), said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine producing turbine engine exhaust gases; and

using said turbine engine exhaust gases to supercharge said piston engine (See Figures 2-3, 5, 7-8, 10-11);

wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a compression ignition engine (See Column 1, Lines 26-67, Column 2, lines 1-6, Column 3, lines 63-68, and Column 4, lines 1-16);

wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a homogenous charged

Art Unit: 3748

compression ignition engine (See Column 1, Lines 26-67, Column 2, lines 1-6, Column 3, lines 63-68, and Column 4, lines 1-16);

wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a variable compression engine Column 3, lines 63-68, and Column 4, lines 1-16);

wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a nitrogen enriched air combustion engine;

the step of operating said piston engine fuel rich thereby producing a reducing atmosphere and suppressing the formation of NO_x;

the steps of burning most of said fuel is in said the piston engine and maintaining said piston engine exhaust gases sufficiently fuel rich for a second burn in said turbine engine;

wherein said step of combusting said fuel in a piston engine in a first stage comprises combusting said fuel in a compression ignition engine that has heterogeneous combustion resulting in said fuel in said piston engine exhaust gases being at stoichiometric conditions (See Figures 2-3, 5, 7-8, 10-11; Column 22, lines 45-67, Columns 23-25, lines 1-67, and Column 26, lines 1-60).

Regarding claims 25-26, 28-30, 32-33, and 35-47, Melchior further discloses said step of using said turbine engine exhaust gases to supercharge said piston engine comprising:

using said turbine engine exhaust gases to drive a compressor (2, 20, 21, 103, 203) that supercharges said piston engine (See Figures 2-3, 5, 7-8, 10-11);

using said compressor (2, 20, 21, 103, 203) to provide compressed air to said turbine engine for said the step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine (See Figures 2-3, 5, 7-8, 10-11).;

said piston engine being a compression ignition engine and wherein excess air is added in said turbine engine is increased to ensure that all hydrocarbons and particles are burned (See Figures 2-3, 5, 7-8, 10-11);

said piston engine is a spark ignition engine that is operated fuel rich to suppress engine knock (See Column 29, lines 40-50);

said step of combusting said fuel in a piston engine in a first stage being combusted with an oxidizer stream (air intake);

said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine stage is combusted with an oxidizer stream; wherein said oxidizer stream is air (See Figures 2-3, 5, 7-8, 10-11); and

said step of combusting said fuel in a piston engine in a first stage and/or said step of combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine stage is combusted with an oxidizer stream (See Figures 2-3, 5, 7-8, 10-11);

said steps of combusting take place to perform work and to provide heat (See the entire document);

wherein said heat is used for a furnace; for a boiler; for a smelter;
and for an Otto engine;

the step of providing a bypass valve (108-108e, 109, 110; or 312) placed
in front of said piston engine to assist starting and acceleration of said piston
engine (See Figure 9 and 14);

the step of providing direct fuel injection into said turbine engine to assist
starting and acceleration of said piston engine (See Figure 14);

the step of providing a starter (300) to said turbine engine to start said
turbine engine and said piston engine (See Figure 14); and

the step of providing a mixing device (107) between said piston engine
exhaust and said turbine engine entrance to make a well-stirred fuel and oxidizer
stream into said turbine engine (Figure 9).

Note that the recitations of said heat being used for a furnace; for a boiler; for a
smelter; and for an Otto engine are considered as intended use.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5-7, 11-15, and 36-37 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over

Art Unit: 3748

Melchior (Patent Number 4,233,815), in view of Marin et al (Pub. Number 2003/0101725 A1).

Melchior further discloses said fuel being oil, methane, natural gas, ammonia, alcohols and/or ethers; said fuel is any combustible matter including fossil fuels (oil, natural gas, coal, etc.) inorganic fuels (ammonia, hydrazine, calcium, etc.) and/or organic fuels (alcohols, ethers, wood, etc.) (Read as fuel by the definition. Fuel is a material that is burnt to release heat energy, i.e. coal, oil, or uranium (McGraw-Hill Dictionary of Science and Engineering, Third Edition, 1984).

However, Melchior fails to specifically disclose organic fuels, inorganic fuels, and/or combustible matter.

Marin teaches that it is conventional in the power plant art, to utilize any combustible matter including oil, coal, methane, natural gas, and/or inorganic fuels including ammonia, hydrazine, calcium, and/or organic fuels including alcohols and/or ethers; any combustible matter including fossil fuels inorganic fuels and/or organic fuels (See Column 3, lines 56-62).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized organic fuels, inorganic fuels, and/or combustible matter, as taught by Marine, to improve the efficiency and to reduce emissions of the Melchior device.

Claims 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melchior (Patent Number 4,233,815), in view of Becker et al. (Patent Number 6,089,855).

Melchior discloses the invention as recited above; however, Melchior fails to disclose the stoichiometric conditions at reduced combustion temperatures where NO_x is difficult to form; and the residence time of combusting said fuel to ensure that all hydrocarbons and particles are burned.

Marin teaches that it is conventional in the power plant art, to utilize combusting said fuel contained in said piston engine exhaust gases in a second stage turbine engine occurring at or near stoichiometric conditions at reduced combustion temperatures where NO_x is difficult to form; and the residence time of combusting said fuel contained in said piston engine exhaust gases in said turbine engine being increased to ensure that all hydrocarbons and particles are burned (See Figure 1, Abstract, Column 8, lines 1-8, and Column 9, lines 34-46).

It would have been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized the stoichiometric conditions at reduced combustion temperatures where NO_x is difficult to form; and the residence time of combusting said fuel to ensure that all hydrocarbons and particles are burned, as taught by Becker, to reduce exhaust emissions of NO_x combustion products.

Claims 31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melchior (Patent Number 4,233,815), in view of either Anne Stark: "New

Art Unit: 3748

Power Plant Combustion Model Lowers Pollutant Emissions at Affordable Cost"
(EUREKALERT, On Line, http://www.eurekalert.org/pub_release/2002-04/dlnl-npp042902.php), or Sekar et al. (Patent Number 5,526,641).

Melchior discloses the invention as recited above; however, Melchior fails to disclose said oxidizer stream being nitrogen-enriched air.

Anna Stark/Sekar teaches that it is conventional in the power plant art, to utilize said oxidizer stream being nitrogen enriched air (See the entire document of Anna Stark, or Abstract, Figure 1 of Sekar).

It would has been obvious to one having ordinary skill in the art at that time the invention was made, to have utilized said oxidizer stream being nitrogen enriched air, as taught by Anna Stark/Sekar, to reduce pollutant emissions in the environment.

Conclusion

The IDS(s) (PTO-1449) filed on September 09, 2003 and January 13, 2004 have been considered. Each initialized copy is attached hereto.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Fischer et al. (Pub. Number US 2003/0152879 A1) disclose a multistage combustion using nitrogen enriched air.

- Melchior et al. (US Patent Number 4,026,115) disclose supercharged internal combustion diesel engines with a combustion chamber being fed by the fuel supply system, which enters the primary zone of the turbulence produced in the zone by the air

Art Unit: 3748

through the orifices, so that a complete and stable combustion is achieved in the auxiliary combustion chamber.

- Kobayashi et al. (US Patent Number 4,517,802) disclose a turbocharger combustor method having a fuel control system for supplying to the combustor in response to the engine operating conditions.

- Melchior et al. (US Patent Number 4,430,860) disclose supercharged internal combustion engines, inter- alia diesel engines.

- Melchior (US Patent Number 4,009,574) discloses compression ignition internal combustion engines.

- Nettel (US Patent Number 2,633,698) discloses a turbocharger means to heat intake of compression ignition engine for starting.

- Dumont (US Patent Number 3,163,984) discloses a supercharged internal combustion engine arrangement.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai-Ba Trieu whose telephone number is (571) 272-4867. The examiner can normally be reached on Monday - Thursday (6:30-5:00).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas E. Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

Art Unit: 3748

published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TTB
January 28, 2005



Thai-Ba Trieu
Primary Examiner
Art Unit 3748